Remarks

Pending claims 5-10, 14-19 and 24-29 (including withdrawn claims 6-9, 15-18, and 24-27) have been cancelled. New claims 30-37 have been added. New claim 30 corresponds to claim 14, except that it has been written in independent form. New claim 31 corresponds to claim 23. Support for new claims 32, 33 and 35 is found in Table 1 (on page 6 of the present specification); while support for new claim 36 is found at page 3, lines 25-26 of the specification. Support for new claims 34 and 37 is found in Example 1, specifically at page 5, line 30. Accordingly, no new matter has been added as a consequence of this amendment.

Pursuant to the outstanding Office Action claims 5, 10, 14 and 28 stand rejected under 35 USC 102(e) as being anticipated by United States Patent Application Publication No. 2008/0319023 (Richman et al); claims 5, 10, 14 and 28 stand rejected under 35 USC 103 as being obvious over Asrar et al (US Patent 6,660,690); claims 10, 19 and 29 stand rejected under 35 USC 103 as being obvious over Jaetsch et al (US Patent Application Publication No. 2001/00272) in view of Oda (JP 2000141317); and claims 5, 10, 14 and 28 stand rejected under the doctrine of obviousness-type double patenting in view of the claims of copending US Application 10/585426 (Richman et al, published as US 2008/0319023). These grounds of rejection are respectfully traversed and reconsideration requested in light of the above amendments and the following remarks.

The Presently Claimed Invention

The presently claimed invention, as amended, relates to a method for controlling termites comprising applying an effective amount of a termiticide comprising (i) bifenthrin and (ii) imidacloprid to a locus where termite control is needed or expected to be needed. Such composition is characterized in that the amount of bifenthrin is equal to from 0.0005% by weight to 0.50% by weight of all components in the composition and the amount of imidacloprid is equal to from 0.0005% by weight to 0.50% by weight of all components in the composition (claim 30); or in that the weight ratio of bifenthrin:imidacloprid is between 1:2 and 1:20 (claim 35).

As is shown by the data presented in Table 1 (on page 6 of the specification), the presently claimed invention provides unexpectedly desirable control of termites. Significantly, such data shows that the method of the present invention exhibits relatively low lethality until 2 days after contact; while exhibiting complete mortality after one week.

As will be understood by one of skill in the art, such delayed mortality is extremely important in controlling termites. In this regard, the Examiner's attention is directed to the section entitled "Treated-Zone Termiticides" on page 4 of Susan C. Jones, "Termite Control", Ohio State University Extension Fact Sheet (a copy of which is appended hereto). Jones notes in this section that:

> *"As termites penetrate the "treated zone," they contact the active ingredient, which causes delayed mortality and also possibly allows the termites to be overcome by lethal microbes. Furthermore, the toxicant is thought to be passed to nestmates through grooming activities and social food exchange (trophallaxis)."*

It is apparent that such grooming activities and trophallaxis cannot occur if the termiticides(s) employed are too lethal such that termites encountering them die before they can return to the nest. Thus the delayed lethality demonstrated for the claimed compositions is highly desirable.

<u>The Rejection Under 35 USC 102(e) in view of Richman et al (US 2008/0319023)</u>

The presently claimed invention claims priority from US Provisional Application 60/556,229, filed March 25, 2004. It is noted that Example 1 of US 60/556,229 shows the control of termites by a composition comprising 10 ppm (0.001% by weight) bifenthrin and 100 ppm (0.01% by weight) of imidacloprid; which composition possesses a bifenthrin:imidacloprid weight ratio of 1:10. Accordingly, such document demonstrates a reduction to practice of the presently claimed invention as of at least March 25, 2004.

US 2008/0319023 was published on December 25, 2008, is based upon PCT application PCT/US05/00584 filed January 7, 2005, and claims priority from US Provisional Application

60/535,667 filed on January 9, 2004. Consequently, only the subject matter of US 60/535,667 predates the March 25, 2004 priority date of the present application.

In this regard, it is noted that US 60/535,667 contains two examples: Example 1 which shows the ten minute knockdown and 30 minute mortality of compositions comprising 600 ppm of bifenthrin + 250 ppm, 500 ppm or 1000 ppm of imidacloprid against German cockroaches; and Example 2 which shows the results at the same times for identical compositions against red imported fire ants. The bifenthrin: imidacloprid weight ratios of such examples thus range from 1:0.4 to 1:1.7 – well outside the ratios of 1:2 to 1:20 contained in new claims 32 and 34. In addition, such examples employ at least 600 ppm (0.006% by weight) of bifenthrin above the 0.005% limit of new claim 33. Further, there is no disclosure in US 60/535,667 of the use of compositions comprising bifenthrin and imidacloprid against termites. Consequently, it is urged that US 60/535,667 does not anticipate new claims 30-35.

As is discussed above, in order to be effective it is important that termicidal compositions do **not** exhibit high short term mortality – as such a quick kill would prevent poisoned termites from returning to their nest and engaging in trophallaxis. Instead of controlling the entire colony, only a few individual termites would be affected.

The two examples in US 60/535,667 both indicate that the combination of bifenthrin + imidacloprid will quickly provide effective control of insects (exposure to the mixtures killed at least 90% of the German cockroaches and 100% of the fire ants after 30 minutes) – thereby indicating to one of ordinary skill in the art that the use of such combination to control termites would be undesirable, as one would expect that a similar quick kill would be observed.

Accordingly, the data presented in Table 1 of the present application (wherein 3% or less mortality was observed for termites after 2 hours) is completely unexpected from a reading of US 60/535,667. In view of such unexpected results, it is submitted that new claims 31-37 are not obvious in view of US 60/535,667.

<u>The Rejection Under 35 USC 103 in view of Asrar et al (US Patent 6,660,690)</u>

Asrar et al (US Patent 6,660,690) is directed to a method of preventing damage to seeds comprising treating such seeds with a composition comprising a pyrethroid and at least one other insecticide. The Examiner has rejected the claims as being obvious in view of Asrar et al on the

basis that (a) the combination of bifenthrin and acetamiprid is included among the combinations of pyrethroids and non-pyrethroid insecticides that allegedly exhibit synergistic pesticidal activity in Table 1 (Composition #77); and (b) Reticulitermes spp (termites) are among the target pests of the compositions of Asrar et al.

Preliminarily, Applicants note that Asrar et al fail to explicitly teach the combination of bifenthrin and imidacloprid to control termite populations. Indeed, at column 22, lines 46-50, Asrar et al specifically indicate that "The target pest for the present invention is an adult or larvae of any insect or other pest that feeds on the seed, roots and/or shoots and foliage of the plant that is to be protected by the subject method." Accordingly, subterranean termites – and *Reticulitermes flavipes* in particular – would not be considered to be within the Reticulitermes ssp. listed by Asrar et al at Column 23, lines 23-24, as such termites feed off the cellulose present in wood or similar substances, and not off the seeds, roots or shoots of plants.

Further, while Asrar et al alleges that a great number of combinations of pyrethroid/non-pyrethroid insecticide combinations are synergistic for a great number of insect genera over a large ratio of combinations, the sole relevant example provided by Asrar et al shows the unpredictability of the art as well as the complete lack of supporting data for such allegation.

Specifically, Asrar et al allege that each of the 825 combinations listed in Table 1 (including composition 77 which comprises bifenthrin + imidacloprid) will exhibit synergistic activity against the approximately 150 listed exemplary genera of insects listed in Paragraphs 54-80 at weight ratios of from 1000:1 to 1:1000 (see Paragraph 85). However, it is noted that the only data provided by Asrar et al (in Table 3) shows that many of the mixtures of the **sole** mixture exemplified (tefluthrin + acephate) – all of which mixtures should be synergistic according the Asrar et al's shotgun disclosure – **do not exhibit synergy** when tested against the **sole** insect species tested (black cutworm).

For convenience sake, Table 3 of Asrar et al is reproduced below:

TABLE 3

Protection of corn plants against black cutworm damage by seed treatments with tefluthrin, acephate and combinations of the two.

TREAT-MENT	Tefluthrin (gm/100 kg seed)	Acephate (gm/100 kg seed)	STAND REDUCTION (% at 10 days)	Percent of Control	Synergy
RAZE	100		75	75	
RAZE	200		100	100	
RAZE	300		83	83	
ORTHENE		100	6.3	6.3	
ORTHENE		200	18.4	18.4	
RAZE/ ORTH	100	100	9.4	9.4	NO
RAZE/ ORTH	100	200	9.4	9.4	YES
RAZE/ ORTH	200	100	33	33	NO
RAZE/ ORTH	200	200	9.4	9.4	YES
RAZE/ ORTH	300	100	13.5	13.5	NO
RAZE/ ORTH	300	200	7.1	7.1	YES
UN-TREATED CONTROL	0	0	100		

It is noted that, according to such Table, combinations of tefluthrin + acephate are not synergistic when applied at 1:1 ratio (i.e., at 100 gm/kilogram each) but are synergistic when applied in the same ratio at higher amounts (i.e., at 200 gm/kilogram each). Similarly, it is noted that no synergy is present when such compounds are applied at 2:1 or 3:1 ratios; but synergy is alleged to occur when they are employed in a 3:2 ratio. Applicants urge that, in light of such data, Asrar et al – rather than suggesting the present invention as being obvious – show the unpredictability of the subject matter involved.

Accordingly, Applicants respectfully assert that the rejection of the pending claims is in error as it represents an "obvious to try" rejection which is not supported by the facts of the present invention. In this regard, the Examiner's attention is drawn to the recent decision of the CAFC in *Ortho-McNeil Pharmaceutical, Inc. v. Mylan Labs, Inc.*, 520 F.3d 1358 (Fed. Cir. 2008), which decision is cited in the recent "Examination Guidelines Update: Developments in the Obviousness Inquiry After KSR v. Teleflex" issued by the Patent and Trademark Office in the Federal Register (Vol. 75, No. 169) on September 1, 2010 at pages 53654-5.

As is noted in such Guidelines (at page 53655, first column, third full paragraph):

> *"Thus Ortho-McNeil helps to clarify the Supreme Court's requirement in KSR for 'a finite number' of predictable solutions when an obvious to try rationale is applied: Under the Federal Circuit's case law 'finite' means 'small or easily traversed' in the context of the art in question."*

In the present case, as is emphasized above, the "solutions" proposed by Asrar et al are not predictable – the sole combination actually evaluated in such publication exhibiting inconsistent results when tested against a single insect species. Further, the scope of "solutions" proposed by Asrar et al is neither small nor easily traversed. As is also emphasized above, Asrar et al allege that each of the 825 combinations listed in Table 1 (including composition 77 which comprises bifenthrin + imidaclopridprid) will exhibit synergistic activity against the approximately 150 listed exemplary genera of insects listed in Paragraphs 54-80 at weight ratios of from 1000:1 to 1:1000 (see Paragraph 85). Thus the number of "solutions" proposed by such publication is not "finite" as this term has been interpreted by the CAFC.

Accordingly, as the solutions proposed by Asrar et al are neither finite nor predictable, it is urged that the rejection of the present claims as being obvious to try is improper and should be withdrawn.

<u>The Rejection Under 35 USC 103(a) over Jaetsch et al (US Patent Application 2001/0027217) in view of Oda et al (JP 2000141317)</u>

The presently claimed invention, as amended, is directed to a method of controlling termites employing a liquid termiticide composition comprising both bifenthrin and imidacloprid. Such method will effectively protect houses and other wooden structures from termite damage, and can be effectively employed to treat termite colonies as well as individual termites.

In contrast, Jaetsch et al disclose the incorporation of an anti-termite compound (which may be bifenthrin, imidacloprid or any of several other termiticides – see paragraph 27) into the adhesive used to prepare wood composite materials such as plywood. Preliminarily, Applicants note that there is no disclosure or suggestion in Jaetsch et al that combinations of termiticides in

general, much less of imidacloprid and bifenthrin in particular, could be employed. Further, it will be appreciated by one of skill in the art that the adhesive composition disclosed by Jaetsch et al would not provide protection to a wooden structure – while the plywood comprising such adhesive may be protected, the wooden beams and supports typically employed as a housing frame would not be protected. Indeed, it is likely that the incorporation of a termite repelling substance such as bifenthrin into plywood would divert termites entering the structure to instead devour the untreated wooden beams.

Oda et al discloses a glycol ether/paraffin based composition (which may additionally comprise a termiticide such as bifenthrin or imidacloprid) which is applied to wood surfaces in order to provide protection. Similarly to Jaetsch et al, there is no disclosure or suggestion in Oda et al that combinations of termiticides in general, much less of imidacloprid and bifenthrin in particular, could be employed. In order to be effective, the composition of Oda et al must be applied to each wooden surface to be protected. Not only does this involve considerable labor and expense, but such application is not practical with regard to houses and other similar pre-existing wooden structures.

It is highly pertinent that neither the compositions of Jaestch et al nor of Oda et al create a termiticide zone through which termites must pass in order to enter a structure (as both trap the termiticide within the wood itself). Accordingly, such prior art compositions do not either (1) prevent or discourage termites from entering a structure; or (2) infect a termite with a delayed lethal dose of termiticide such that such termite can spread the poison throughout the colony via trophallaxis. Further, nothing in either of such publications suggest that the combination of bifenthrin and imidacloprid employed in the claimed concentrations and/or ratios would exhibit the unexpected benefits demonstrated by Applicants.

Consequently, it is urged that the present claims are not suggested by Jaetsch et al, even if read in combination with Oda et al.

The Double Patenting Rejection

It is noted that this ground of rejection is provisional, as neither the present claims nor those of Application No. 10/585,426 have been granted. Applicants further note that a terminal disclaimer may be filed to overcome this rejection in the event that pertinent claims are allowed in both applications.

Conclusion

In light of the foregoing, Applicants urge that the presently claimed invention, as amended, is neither anticipated nor suggested by the cited publications. Reconsideration is respectfully requested.

Should the Examiner have any questions, the Examiner is invited to telephone applicants' undersigned representative.

Respectfully submitted,

April 28, 2011

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Ohio State University Extension Fact Sheet

Entomology

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Termite Control

HYG-2092-03

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Subterranean termites are the most common and economically important wood-destroying organisms in the United States. Termites feed on materials that contain cellulose, primarily dead wood and wood by-products. Subterranean termites are closely associated with the soil habitat where they excavate a network of tunnels through the soil to reach water and food. These termites need moisture to survive.

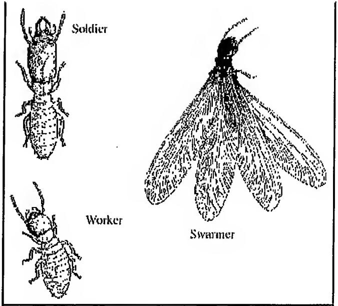
Biology

Subterranean termites are social insects that live in colonies that may contain hundreds of thousands of individuals. Termite colony members are dispersed throughout the soil and can extend underground tunnels tens to hundreds of feet to reach feeding sites. Detailed information on the life cycle and biology of subterranean termites in the eastern United States is available in OSU Extension Bulletin 1209.

Each termite colony contains three forms or castes, which are the workers, soldiers, and reproductives. These castes are physically distinct and perform different tasks in the termite society.

Workers are about 1/8 inch long and are blind,

wingless, soft-bodied, creamy white to grayish-white with a round head. Workers are the most numerous individuals in a termite colony, and they are the termite caste that actually eats the wood. These sterile individuals forage for food and water, construct and repair shelter tubes, feed and groom other termites, care for eggs and young, and participate in colony defense.



Common Name	Scientific Name
eastern subterranean termite	*Reticulitermes flavipes* (Kollar)

Soldiers are also wingless and resemble workers except that they have a large, rectangular, yellowish-brown head with large mandibles (jaws). The soldiers' primary function is colony defense.

Male and female reproductives can be winged (primary) or wingless (neotenic). Each can produce new offspring. Winged primary reproductives are called alates or swarmers. However, they shed their wings soon after flight. Their body color varies by species from black to yellow-brown. The eastern subterranean termite, *Reticulitermes flavipes*, is the most common termite in Ohio and its alates are black and about 0.4 inch long, with pale or grayish, translucent wings. A pair of primary reproductives that heads a colony is called the king and queen. Neotenic reproductives often serve as replacements if something happens to the king and queen. Neotenic reproductives are generally yellow or mottled black and the female's abdomen may be distended due to developing eggs.

Detection of Termites

It is important for homeowners to recognize the signs of a subterranean termite infestation. Subterranean termites may be detected by the sudden emergence of winged termites (alates or swarmers), or by the presence of mud tubes and wood damage.

Winged Termites

Large numbers of winged termites swarming from wood or the soil often are the first obvious sign of a nearby termite colony. Swarming occurs in mature colonies that typically contain at least several thousand termites. A "swarm" is a group of adult male and female reproductives that leave their colony in an attempt to pair and initiate new colonies.

Alate emergence is stimulated when temperature and moisture conditions are favorable, usually on warm days following rainfall. In Ohio, swarming typically occurs during daytime in the spring (March, April, and May), but swarms can occur indoors during other months. However, swarming occurs during a brief period (typically less than an hour), and alates quickly shed their wings. Winged termites are attracted to light, and their shed wings in window sills, cobwebs, or on other surfaces often may be the only evidence that a swarm occurred indoors. The presence of winged termites or their shed wings inside a home **should be a warning of a termite infestation.**

Termite swarmers have straight, bead-like antennae; a thick waist; and two pair of long, equal-length wings that break off easily. Winged termites can be differentiated from winged ants, which have elbowed antennae, a constricted waist, and two pair of unequal-length wings (forewings are larger than hind wings) that are not easily detached. Ants also generally are harder-bodied than termites.

Mud Tubes

Other signs of termite presence include mud tubes and mud protruding from cracks between boards and beams. Subterranean termites transport soil and water above ground to construct earthen runways (shelter tubes) that allow them to tunnel across exposed areas to reach wood. Shelter tubes protect them from the drying effects of air and from natural enemies, such as ants. These tubes usually are about 1/4 to 1 inch wide, and termites use them as passageways between the soil and wood. To determine if an infestation is active, shelter tubes should be broken or scraped away and then monitored to determine whether the termites repair them or construct new ones. Houses should be inspected annually for mud tubes.

Wood Damage

Termite damage to the wood's surface often is not evident because termites excavate galleries within materials as they feed. Wood attacked by subterranean termites generally has a honeycombed appearance because termites feed along the grain on the softer spring growth wood. Their excavations in wood often are packed with soil, and fecal spotting is evident. When inspecting for termites, it is useful to probe wood with a knife or flat blade screwdriver to detect areas that have been hollowed. Severely damaged wood may have a hollow sound when it is tapped. Subterranean termites do not reduce wood to a powdery mass, and they do not create wood particles or pellets, as do many other wood-boring insects.

Prevention

Preventive practices are a critical aspect of termite management. Prevention of subterranean termite infestation of wooden structures centers upon disrupting their ability to locate moisture, food (wood), and shelter. OSU Extension Fact Sheet HSE-1000-00 lists measures that can be employed to reduce the risk of termite infestation.

Avoid moisture accumulation near the foundation, which provides water needed for termite survival. Divert water away from the foundation with properly functioning downspouts, gutters, and splash blocks. Soil needs to be graded or sloped away from the foundation in order for surface water to drain away from the building.

Cellulose (wood, mulch, paper, etc.) that is in contact with soil provides termites with ready and unobservable access to food. It is very important to eliminate any contact between the wooden parts of the house foundation and the soil. Maintain at least 6 inches between the soil and porch steps, lattice work, door or window frames, etc. Never stack or store firewood, lumber, newspapers, or other wood products against the foundation or within the crawl space. Prevent trellises, vines, etc. from touching the house. Before and during construction, never bury wood scraps or waste lumber in the backfill, especially near the building. Be sure to remove wooden or cellotex form boards, grade stakes, etc. used during construction. Remove old tree stumps and roots around and beneath the building. Avoid or minimize use of wood mulch next to the foundation.

Control Measures

Termites feed slowly so there is no need to panic if they are discovered in one's home. A few weeks or months may be needed to decide on a course of treatment, which typically requires employing a professional pest management firm. Homeowners seldom have the experience, availability of pesticides, and equipment needed to perform the job effectively. Consider getting at least three estimates before signing a contract for control measures, and be cautious of price quotes that are substantially lower or higher than the others. Prices for inspection, treatment estimates, and conditions of warranties often vary considerably. A guarantee is no better than the firm who presents it. It is important to take your time to select a reputable pest management firm. Deal only with licensed, certified pest management firms having an established place of business and a good professional reputation. Ideally the firm will belong to a city, state or national pest management association. It is a good idea to consult the licensing agency in your state to determine a firm's complaint history. In Ohio, licenses are issued through the Pesticide Regulation Section of the Ohio Department of Agriculture (614-728-6987 or 800-282-1955). Information on selecting a reliable pest management firm is presented in OSU Extension Fact Sheet HYG-2091-95.

Soil Barrier Termiticides

Conventional soil treatments rely on creating a chemical barrier in the soil that is toxic to termites contacting it. Many also have repellent characteristics and termites avoid treated soil. To achieve termite control for long periods of time, such termiticides must be applied as a continuous barrier in the soil next to and under the foundation. If there are untreated gaps in the soil, termites may circumvent the chemical treatment. Hence, such treatments during preconstruction can provide for more uniform coverage. Once a home is constructed, the chemical has to be injected through drill holes and trenching around the foundation, which can result in less accurate coverage. Effective termite control usually requires specialized equipment and often 150 or more gallons of prepared termiticide solution per house, depending on size, basement, etc.

Termiticides that act by creating a chemical barrier in the soil include bifenthrin (Talstar®), cypermethrin (Demon®, Prevail®), and permethrin (Dragnet®, Prelude®). Chlorpyrifos (Dursban®) can be used only during preconstruction and only until December 31, 2005.

In reference to "spot treatments only" using chemical barrier termiticides only in areas of the house where termites are seen, most pest management firms will refuse such treatments or will not guarantee such treatments. The reason is that termites have a very high probability of finding other untreated points of entry into the structure. Localized spot treatments are considered risky except in re-treatment situations.

Treated-Zone Termiticides

The most recent termiticides to be marketed are non-repellent to termites, but show delayed toxicity as termites forage through treated soil, which they do not avoid. As termites penetrate the "treated zone," they contact the active ingredient, which causes delayed mortality and also possibly allows the termites to be overcome by lethal microbes. Furthermore, the toxicant is thought to be passed to nestmates through grooming activities and social food exchange (trophallaxis). Control usually is achieved within 3 months. As with soil barrier termiticides, specialized application equipment and large volumes of chemical solution are needed.

Non-repellent termiticides include fipronil (Termidor®), imidacloprid (Premise®), and chlorfenapyr (Phantom®).

Baits

Termite baiting is a very complex subject that is discussed in detail in the OSU Extension Fact Sheet HYG-2092A-03, Termite Baits. Bait technology uses wood or a cellulose matrix favored by termites that is impregnated with a slow-acting toxic chemical. Termite workers feed upon the bait and transfer it by grooming or trophallaxis to other colony members, eventually reducing or eliminating the entire colony. Termites are not site-specific, but rather, they forage among various food sites, which results in the bait being encountered by many colony members. The toxicant necessarily is slow acting because termites tend to avoid sites where sick and dead termites accumulate.

Typically, in-ground stations are inserted in the soil next to the structure and near known or suspected sites of termite activity. In-ground stations often initially contain untreated wood that serves as a monitoring device. The monitoring wood is replaced with the toxicant once termites have been detected feeding on it. In addition, aboveground stations may be installed inside or on the structure in the vicinity of damaged wood and shelter tubes. Aboveground stations initially contain bait.

It is very important that bait systems are properly installed and diligently serviced. Monthly inspections of a baiting system usually are necessary, except during inclement winter weather. **Successful termite baiting necessitates proper monitoring and maintenance of the stations.**

Baits work much more slowly than soil termiticides, and the homeowner should be aware of the possibility of a lengthy baiting process. Several months or more may elapse before the termites locate stations, then termites must feed on sufficient amounts of the toxicant.

An often-cited advantage of termite baits is that they are "environmentally-friendly" because they use very small quantities of chemical and decrease the potential for environmental contamination. In addition, bait application causes little disruptive noise and disturbance compared to soil treatments. Furthermore, baits can be used in structures with wells or cisterns, sub-slab heating ducts, and other features that may preclude a soil treatment. Baits are often used in sensitive environments.

A number of baits have been marketed to control termites. Bait products that are available for licensed pest management professionals include the Sentricon® Termite Colony Elimination System (hexaflumuron [Recruit® II bait] or noviflumuron [Recruit® III bait]), FirstLine® Termite Defense System (sulfluramid), Exterra® Termite Interception and Baiting System (diflubenzuron [Labyrinth® bait]), Subterfuge® Termite Bait (hydramethylnon), and Outpost® Termite Bait Response (diflubenzuron). Not all of these bait systems are equally effective. It is advisable to review the independent research that has been conducted on a particular bait, as some products have been evaluated much more rigorously than others.

Spectracide Terminate® (sulfluramid) and Termirid® 613 (borate) can be purchased by homeowners. However, Terminate® is not recommended as sole protection against termites, and an active infestation should be treated by a professional. Termirid® can be used to reduce subterranean termite populations. Little or no research has been conducted to verify the effectiveness of these products, particularly when used by homeowners.

Some alternate termite controls include:

Treated Wood

Borates (disodium octaborate tetrahydrate [Tim-bor®, Bora-Care®, Jecta®], Impel®) and pressure-treatments (creosote, chromated copper arsenate [CCA]) protect wood against termites and wood-decay fungi. However, even creosote-treated railroad ties and telephone poles, and CCA-treated wood, over

time, can be subject to termite attack. Termites can build mud tubes over treated surfaces. Furthermore, they can gain entry through cut and cracked ends or areas where the chemical has not sufficiently penetrated.

Wood treatments are primarily used to supplement other termite control measures, because termites are able to attack untreated wood in other areas of the structure. It is advisable to use pressure-treated wood in situations where wood is in direct contact with soil or exposed to rainfall. Borates are fairly soluble in water, so borate-treated wood should be protected from constant rewetting.

Borates may be applied to wood by homeowners. As of 1 January 2004, CCA-treated wood is no longer available for use in most residential settings because of concerns regarding its arsenic content.

Physical Barriers

Physical barriers are particularly appropriate during the preconstruction phase to provide protection of the structure from subterranean termites. One such physical barrier is stainless-steel wire mesh (TermiMesh®) that is fitted around pipes, posts, or foundations. The newest physical barrier, Impasse® Termite System, contains a liquid termiticide (lambda-cyhalothrin) locked in between two layers of heavy plastic that is installed before the concrete slab is poured. It is supplemented with Impasse® Termite Blocker, which uses special fittings around plumbing and electrical pipes and conduits.

Biological Control Agents

Certain species of parasitic round worms (nematodes) will infest and kill termites and other soil insects. They have been promoted and marketed by a few companies. Although effective in the laboratory, control is often quite variable under field conditions. Limited success with nematode treatments may be attributed to the ability of termites to recognize and wall-off infected individuals, hence limiting the spread of nematodes throughout the colony. Furthermore, soil moisture and soil type appear to limit the nematode's ability to move in the soil and locate termites.

A fungus *Metarhizium anisopliae* (Bio-Blast®) is a biological termiticide that requires special application and handling techniques. It is labeled for aboveground application to termite infestations in structures, but it is not labeled for application to the soil. Spray effectiveness is enhanced when applied to many foraging termites because infected termites can pass the fungus to nestmates. However, it is difficult to infect a large enough number of termites for the infection to spread throughout the colony. Furthermore, it provides no long-lasting residual activity, and the fungal spores die with the dead termites. Insufficient research has been conducted to indicate whether this is an effective method for controlling termites.

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Keith L. Smith, Associate Vice President for Ag. Adm. and Director, OSU Extension.

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